

REMARKS

Entry of this Amendment prior to examination is respectfully requested.

This Amendment is in response to the Final Office Action dated July 23, 2003, and is being submitted as the submission for RCE following a telephone interview conducted with Examiner Weiss on July 23, 2003.

Appreciation is expressed to Examiner Weiss for his courtesy and helpfulness during the course of the above-noted July 23rd telephone interview. At that time, the proposed amendments set forth by the present Amendment were discussed, particularly with regard to the independent claims 20 and 24. It was noted at that time by the undersigned attorney that these amendments serve to emphasize a structural distinction over the cited prior art and a functional distinction regarding the relaxing of thermal stress, both of which features will be discussed in greater detail below. In considering these proposed amendments, Examiner Weiss advised the undersigned attorney that these amendments would require a further search and substantial further consideration, both with regard to the proposed structural amendment and the functional amendment. Accordingly, Examiner Weiss indicated that this Amendment would not be entered after final rejection. Therefor, the present Continuation application is being filed to obtain entry and full consideration of the Amendment.

As discussed during the interview, the present invention is directed to an improved wiring tape for a semiconductor device for providing a three-layer buffer layer (such as indicated by the numerals 1 and 2 in Figs. 1, 2 and 3) between a semiconductor chip (numeral 5) and a wiring layer composed of wiring (e.g. numeral 4) and an insulating layer (e.g. numeral 3). In particular, the buffering layer is

designed to relax thermal stress generated between the semiconductor chip and a packaging substrate (e.g. identified by the numeral 9 in Figs. 4 and 5, for example) as discussed, for example, on page 6, lines 4 and 5, and on page 15, line 26 et seq. of the specification. As set forth in means plus function claim 24, this relaxation of thermal stress is achieved in conjunction with releasing steam pressure generated during a reflow operation used in forming the package, with the steam being released outside the package. As defined in dependent claims 21 and 25, another significant feature of the present invention is the particular design of the core layer thickness ratio between the core layer (numeral 1) and the sandwiching adhesive layers (identified by the numeral 2). More specifically, as shown in Fig. 1, if the ratio a/b is at least 0.1 or greater, the failure rate reduces substantially to 0.

Reconsideration and allowance of the amended independent claims 20 and 24 over the cited references to Hiwada (JP 07-245471) and Culane (USP 5,973,389) is respectfully requested. As discussed during the interview, the present Amendment introduces two further distinguishing features over the cited prior art. The first of these features is the fact that the claimed three layered buffer layer structure, in conjunction with the other elements, including interconnected foams (or a three-dimensional reticular structure) serves to "relax thermal stress generated between the semiconductor chip and the package substrate." As noted above, this distinguishing feature is clearly supported in the specification on page 6, lines 4 and 5 and on page 15, lines 26 et seq.

With regard to this, it is respectfully submitted that neither Hiwada nor Culane at all deal with this problem of relaxing thermal stress between a semiconductor chip and a packaging substrate (or, more specifically, the specific correlation of this with

releasing steam pressure generated during a reflow operation in forming the package, as defined by the means plus function language of claim 24). Indeed, both of the amended claims 20 and 24 define that this thermal stress is generated during heating. As such, it is respectfully submitted that these references fail to render the present independent claims 20 and 24 obvious, whether the references are considered alone or in combination with one another.

More specifically, the Hiwada reference actually does not require heating at all, and, as such, does not even have a problem of creation of thermal stress during a heating operation occurring during package reflow operations. This is the case because the connection with the contacting conductor in Hiwada is obtained by an elasticity contact, which does not require heating, when the semiconductor chip is mounted on a printed circuit board. This can be seen from the attached partial translation of Hiwada, provided in the Appendix herewith, translating paragraph [0028] and [0029] of Hiwada. As discussed there, the connection is carried out without the need for a reflow operation or the heating utilized therewith. As such, the features added to both independent claims 20 and 24 regarding the relaxing of thermal stress serve to clearly distinguish over Hiwada since Hiwada does not require the heating which generates thermal stress in the first place.

In the Office Action, and during the course of the above-noted interview, the Examiner noted that this proposed distinction is a functional distinction which is not necessary to consider in a product claim. In particular, on page 3 of the Office Action, it is stated that limitations with regard to how the buffer layer is prepared constitute "product by process" limitations which are not necessary to consider in

product claims. Applicants respectfully request careful reconsideration of this on the following two points.

In the first place, independent claim 24 is specifically directed to claiming the invention in terms of means plus function, as specifically authorized by 35 U.S.C. § 112, sixth paragraph. As such, 35 U.S.C. § 112, sixth paragraph, sets forth:

“An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material or acts in support thereof.”

As such, the whole purpose for a means plus function limitation is to define the function, and 35 U.S.C. § 112, second paragraph, clearly permits this as a way of defining an invention over prior art. With regard to this, MPEP 2183 notes that in rejecting a means plus function claim, the first element that the Examiner must show is that the prior art element “performs the function specified in the claim.” Accordingly, clearly in a means plus function claim, it is not proper to ignore the specific function being claimed since the function is the essence of the element being claimed.

In the present instance, as noted above, Hiwada clearly has no suggestion whatsoever of the function of relaxing stress generated between a semiconductor chip and a package substrate during the reflow operation used in forming the package (as called for in claim 24) since Hiwada does not even perform such a reflow operation because he uses elasticity contacting which does not require heating. Therefor, in claim 24, the claimed means for relaxing thermal stress clearly must be considered as a distinction over Hiwada. Further, Culane adds nothing to Hiwada to suggest the complete modification which would be necessary to Hiwada

to arrive at this functional distinction. Therefor, reconsideration and allowance of means plus function claim 24 over Hiwada and Culane is earnestly solicited.

With regard to the structural claim 20, which also includes this limitation, it is noted that this language serves to emphasize the significance of what might otherwise appear to be minor structural distinctions over the cited prior art. In the case of In re Luch, 177 USPQ 523 (CCPA 1973), it is stated:

“As for the method of application, it is well established that product claims may include process steps to whole or partially define the claim product... to the extent these process limitations distinguish the product over the prior art, they must be given the same consideration as traditional product characteristics.” 177 USPQ at 525.

In the present instance, the newly added language regarding relaxing thermal stress relates directly to an improved resulting structure. More specifically, the resulting wiring tape will not suffer from the failure caused by separation of layers, illustrate, for example, in Fig. 1. As such, it is urged that the limitations directed to the manufacturing set forth in claim 20 must be considered, as set forth in the above-noted case of In re Luch, since they do result in an improved structure.

Beyond this, it is noted that although Hiwada teaches a porous P-PTFE structure, there is no disclosure in Hiwada as to whether this structure has interconnected foams or a three-dimensional reticular structure. Thus, the actual structural teachings of Hiwada do not actually teach the specific claimed structure set forth in claim 20 (and claim 24, for that matter) of a three-layer buffer layer including “interconnected foams or a three-dimensional reticular structure.” By the present amendment, the relationship of this claimed structure to the advantage of relaxing thermal stress generated during heating is clearly set forth. Again,

absolutely nothing in Hiwada, or the secondary reference to Culane, teaches or suggests this specific structure or the resulting advantage. Therefor, it is respectfully submitted that independent claim 20 should also be considered as a whole, and, when this is done, the end result should be allowability of the claim.

Reconsideration and allowance of the dependent claims 21, 22, 25 and 26 is also respectfully requested. With particular regard to dependent claims 221 and 22, these claims define setting a thickness ratio between the structure having the interconnected foams or the three-dimensional reticular structure (e.g. thickness "a" in Fig. 1) to the total buffer layer thickness (e.g. thickness "b" in Fig. 1) to be at least 0.2. As shown in Fig. 1, by virtue of this, the failure rate is significantly reduced, and, in fact, approaches zero as the thickness ratio increases. It is respectfully submitted that neither Hiwada nor Culane at all teach or suggest this feature or its relationship to reducing failure rate by reducing thermal stress generated during heating. As such, these claims, when considered with the language of the respective parent claims, serve to further emphasize the distinctions over the cited prior art by defining a setting of the thickness ratio for the specific purpose of relaxing the stress during heating to reduce the failure rate (as shown in Fig. 1). Since Hiwada does not even have the problem of this thermal stress, since he does not require heating for his connecting arrangement, any coincidental relationship in ratios in Hiwada fails to provide any suggestion for setting such ratios for resolving a problem for which Hiwada does not have. Therefor, reconsideration and allowance of dependent claims 21 and 25 over the cited prior art is also respectfully requested, together with further dependent claims 22 and 26 which define further features concerning

lamination of the adhesive layers with the structure of interconnected foams or a three-dimensional reticular structure.

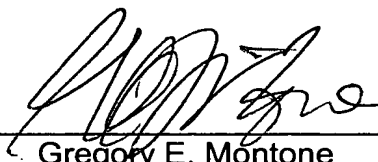
If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 500.36317CV2), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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